

Remarks

This application has been reviewed in light of the final Office Action of April 2, 2004. Claims 1-23 are pending, and all claims stand rejected. In response, claims 21 and 23 are amended; and the following remarks are submitted. Reconsideration of this application, as amended, is requested.

Claim 23 is rejected under 35 USC 112 and has been amended accordingly. The Examiner was correct, that claim 23 was intended to depend from claim 22. Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

The Examiner observed that claim 21 had an antecedent basis problem, and correctly interpreted claim 21. Claim 21 is here amended to formally correct the error.

Applicant asks that the Examiner enter these amendments after final rejection as reflective of the changes noted by the Examiner. The amendments address only sec. 112 type issues that arose for the first time in this Office Action, do not introduce new matter, and do not require an additional examination.

Claims 1-3, 5, 9, 10, 14, 15, 20, 22, and 23 are rejected under 35 USC 102 as anticipated by Schaeffer US Patent 6,123,997. Applicant traverses this ground of rejection.

The following principle of law applies to sec. 102 rejections. MPEP 2131 provides: "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the ... claim. The elements must be arranged as required by the claim..." [citations omitted] This is in accord with the decisions of the courts. Anticipation under section 102 requires 'the presence in a single prior art disclosure of all elements of a claimed invention arranged as in that claim.' Carella v. Starlight Archery, 231 USPQ 644, 646 (Fed. Cir., 1986), quoting Panduit Corporation v. Dennison Manufacturing Corp., 227 USPQ 337, 350 (Fed. Cir., 1985)

Thus, identifying a single element of the claim which is not disclosed in the

reference is sufficient to overcome a Sec. 102 rejection.

Claim 1 recites in part:

“the thermal barrier coating comprising yttria-stabilized zirconia having a yttria content of from about 3 percent by weight to about 5 percent by weight of the yttria-stabilized zirconia”

Claim 22 has a similar limitation.

Schaeffer has no such disclosure. Schaeffer discloses “zirconia ...partially stabilized or partially stabilized with yttria...(for example, 4 to 20 wt. %)” (col. 3, lines 55-56), and “more preferably 6 to 20 weight percent yttria, and most preferably from 6 to 10 weight percent yttria” (col. 3, lines 61-63), but Applicant can find no disclosure of the “from about 3 percent by weight to about 5 percent” limitation of claims 1 and 22.

Claims 2-5, 9, 10, 14, and 15 depend from claim 1 and incorporate its limitations. Claim 23 depends from claim 22 and incorporates its limitations.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 6-8, 11-13, and 16-19, and 21 are rejected under 35 USC 103 over Schaeffer '697. Applicant traverses this ground of rejection.

The following principle of law applies to all sec. 103 rejections. MPEP 2143.03 provides “To establish prima facie obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).” [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art. If limitations are not found in any of the applied prior art, the rejection cannot stand. In this case, the single applied prior art reference clearly does not arguably teach some limitations of the claims.

Claim 6 recites in part:

“an atmosphere having a partial pressure of oxygen of from about 10^{-5} mbar to about 10^3 mbar”

Schaeffer has no such teaching.

The rejection relies upon a teaching in Schaeffer of “greater than 10^{-33} atmosphere” and on the principle of an overlap in the presently recited range.

The law recognizes that, where the prior art discloses extremely broad “laundry-list” ranges, the discovery of a specific narrower range, having improved properties not suggested or taught by the reference, within the broad range may lead to patentability. See, for example, Becket v. Coe, 98F2d 332 (CADC 1938); In re Becket, 33 USPQ 334 (CCPA 1937); In re Arness, 37 USPQ 217 (CCPA 1938). Where there is criticality of the proportions, the recited proportions can lead to patentability. See Ex parte Selby, 153 USPQ 476 (Bd. Appeals 1966); In re Waymouth, 182 USPQ 290 (CCPA 1974).

In the present case, the surprising and unexpected results of practicing the present approach, using the numerical limitations as disclosed in the specification and recited in the rejected claims, counters any prima facie showing of obviousness based upon the overlap of ranges. See specifically the discussion in para. [0024] and [0025] of the present Specification. As stated in para. [0025],

“If the pre-oxidation parameters lie outside these ranges [referring to the recited claim ranges discussed in the preceding paragraph], an alumina scale will be produced, but it will be less desirable than the alumina scale 44 produced by pre-oxidation within these ranges. Comparative microanalysis (scanning electron microscope and XPS) of alumina scale produced using the indicated pre-oxidation parameters and alumina scale produced outside the indicated pre-oxidation parameters

disclosed variations in the nature of the alumina scale. Non-uniform microstructures resulted when the pre-oxidation pressure was greater than about 10^{-4} mbar. The non-uniformity increased when other elements than aluminum and oxygen were present in the alumina scale. Oxygen pressures within the range of from about 10^{-5} mbar to about 10^3 mbar yielded desirable “ridge” type microstructures characteristic of alpha alumina when no elements other than aluminum and oxygen were present in the oxide. Low partial pressures of oxygen, below about 10^{-5} mbar, result in internal oxidation along with an outward diffusion of aluminum. Such a structure has a reduced adhesion to the protective coating 36.”

Schaeffer has no disclosure of these surprising and unexpected results, and does not discuss the structure of the oxide layer at all.

Para. 34 of the Office Action disagrees with these surprising and unexpected results, with no evidentiary basis set forth for the disagreement. The statement in the sentence bridging pages 23-24 of the Office Action is just wrong, in Applicant’s view: “The fact that a certain portion of the range leads to more desirable results and another portion of the range leads to less desirable results is not sufficient to establish unexpected results or that the range is critical.” Such facts are the essence of showing surprising and unexpected results, and are exactly what the case law contemplates.

There is no contradiction in Applicant’s statement that “Non-uniform microstructures resulted when the pre-oxidation pressure was greater than about 10^{-4} mbar.” and in the claimed range of about 10^{-5} to about 10^3 mbar. A non-uniform microstructure may still be superior to the microstructure in the lower-pressure range, as indicated, and does not alter the fact that the desirable ridge-type microstructure was obtained in the claimed range of about 10^{-5} to about 10^3 mbar, even though it was nonuniform in the higher-pressure range.

Claims 7-8, 11, and 17 have similar claim limitations in the sense that they recite

specific narrow oxidation pressure ranges, and are therefore similarly allowable.

Claims 6-8 and 11-13 are dependent from claim 1, which recites in part: "yttria-stabilized zirconia having a yttria content of from about 3 percent by weight to about 5 percent by weight of the yttria-stabilized zirconia." Claim 16 has this same recitation, and claims 17-19 depend from claim 16 and incorporate this limitation. Claim 19 recites an even narrow range of yttria in the YSZ.

As discussed earlier under the sec. 102 rejection, Schaeffer teaches a range of yttria of 4-20 percent, and then preferred ranges of 6-20 percent and 6-10 percent. The preferred ranges teach away from the present approach. Applicant incorporates the prior discussion of limited ranges producing surprising and unexpected results as conferring patentability. In this case, Applicant discusses this limitation of "from about 3 percent by weight to about 5 percent" in para. [0027]-[0030] of the present application. Direct comparative results are presented of compositions within this range as compared with compositions just outside this range and within the preferred range taught by Schaeffer. The present approach produces surprising and unexpected results not taught or suggested by Schaeffer.

In para. 35 of the Office Action, this experimental evidence is discounted. The case law provides that establishing a narrower range of improved results within a broader range of the prior art is sufficient to support patentability.

Claims 12-13 recite the temporal relation of the deposition and oxidation steps. Schaeffer has no teaching of these limitations, as agreed in the explanation of the rejection. Applicant appreciates the great creativity in setting forth the argument in para. 16 of the Office Action, but in fact this argument is simply an attempted hindsight re-creation of the invention recited in the claims with the knowledge gleaned from the present disclosure. The requirements for a sec. 103 rejection are that the prior art teach the claim limitation, not provide a setting in which the claim limitation may be reconstructed and which is not inconsistent with the claim limitation. There is no teaching in Schaeffer of the specific compositional range recited in claim 1 and the process steps recited in claims 12 and 13.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 1-3, 5-9 and 13-23 are rejected under 35 USC 103 over Duderstadt US Patent 5,238,752 in view of Bruce US Patent 5,981,088. Applicant traverses this ground of rejection.

The explanation of the rejection states that “Duderstadt does not explicitly teach that the YSZ has a yttria content of from about 3% by weight to about less than 5% by weight of the YSZ.” In fact it does far more than that. It explicitly teaches away from the claimed range by teaching a range of 6-20 percent by weight of yttria.

Duderstadt may therefore not be applied in rejecting the present claims, as it teaches directly away from a key recitation of all of the claims, “yttria-stabilized zirconia having a yttria content of from about 3 percent by weight to about 5 percent by weight of the yttria-stabilized zirconia.”. It is a well-established principle of law that a prima facie case of obviousness may not properly be based on a reference which teaches away from the present invention as recited in the claims.

“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. In re Sponnoble, 160 USPQ 237 244 (CCPA 1969)...As “a useful general rule,”...“a reference that ‘teaches away’ can not create a prima facie case of obviousness.” In re Gurley, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994)”

Para. 37 of the Office Action notes that Applicant did not point out how Duderstadt teaches away from the claimed range. The point has been made more explicitly above. The Examiner did correctly deduce, however, that the issue is the

teaching of the yttrium oxide range in the YSZ. Duderstadt does in fact teach away from the recited range of "from about 3 percent by weight to about 5 percent by weight of the yttria-stabilized zirconia". The only teaching of a range in Duderstadt is away from this range.

The rejection argues that a person of ordinary skill in the art would know to drop a central teaching of Duderstadt and replace it with a teaching of Bruce. Applicant respectfully disagrees for several reasons. First, Bruce takes great care to distinguish the approach of Duderstadt, see col. 3, line 51-col. 4, line 14, and leads one away from Duderstadt's approach. Second, the combining of the teachings of these references is purely an attempt at hindsight reconstruction of the present claims. The case authority and the MPEP provide guidance on this point. The present rejection is a sec. 103 combination rejection. It is well established that a proper sec. 103 combination rejection requires more than just finding in the references the elements recited in the claim. To reach a proper teaching of an article or process through a combination of references, there must be stated an objective motivation to combine the teachings of the references, not a hindsight rationalization in light of the disclosure of the specification being examined. MPEP 2143 and 2143.01. See also, for example, In re Fine, 5 USPQ2d 1596, 1598 (at headnote 1) (Fed.Cir. 1988), In re Laskowski, 10 USPQ2d 1397, 1398 (Fed.Cir. 1989), W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 311-313 (Fed. Cir., 1983), and Ex parte Levengood, 28 USPQ2d 1300 (Board of Appeals and Interferences, 1993); Ex parte Chicago Rawhide Manufacturing Co., 223 USPQ 351 (Board of Appeals 1984). As stated in In re Fine at 5 USPQ2d 1598:

"The PTO has the burden under section 103 to establish a prima facie case of obviousness. [citation omitted] It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references."

And, at 5 USPQ2d 1600:

"One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."

Following this authority, the MPEP states that the examiner must provide such an objective basis for combining the teachings of the applied prior art. In constructing such rejections, MPEP 2143.01 provides specific instructions as to what must be shown in order to extract specific teachings from the individual references:

"Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention when there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."

* * * * *

"The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)."

* * * * *

"A statement that modifications of the prior art to meet the claimed invention would have been 'well within the ordinary skill of the art at the time the claimed invention was made' because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the

teachings of the references. Ex parte Levengood, 28 USPQ2d 1300 (Bd.Pat.App.& Inter. 1993).”

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure. Neither reference has any teaching that a central teaching of Duderstadt should be dropped and replaced by a contrary teaching of Bruce. If the rejection is maintained, Applicant asks that the Examiner set forth the objective basis found in the references themselves for combining the teachings of the references.

Para. 37 of the Office Action sets forth an argument about substituting the teachings of Bruce for those of Duderstadt. The fact remains that these two references teach disjoint ranges. Duderstadt teaches a yttria content of “from about 6 to about 20 percent” and Bruce teaches a range from “about two to about five weight percent”. The only way to know which of these ranges to choose in combining the teachings of the references is from the present disclosure. It is further argued that “Bruce et al. provides clear, unmistakable, and explicit motivation...” Applicant disagrees. At col. 3, line , line 51-col. 4, line 14, Bruce goes to great lengths to distinguish Duderstadt’s approach of using more than 6 percent yttria and explains why the two approaches are not consistent.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 10-11 are rejected under 35 USC 103 over Duderstadt ‘752 in view of Bruce ‘088, and further in view of Schaeffer US Patent 5,780,110. Applicant traverses this ground of rejection.

Claims 10-11 depend from claim 1. The combination of Duderstadt and Bruce does not teach the recitations of claim 1 for the reasons stated earlier, which are

incorporated here. Schaeffer '110 (the parent case of Schaeffer '697) adds nothing in this regard. Claims 10-11 are therefore allowable over this ground of rejection.

Claims 10 and 11 further each recites in part:

“heating the bond coat to an oxidizing temperature for a time of from about 1/2 hour to about 3 hours.”

Duderstadt expressly teaches against this limitation, by teaching “A period of up to about 10 minutes of the substrate, while being heated to a temperature of about 1800°F.” (col. 7, lines 35-36). Applicant incorporates the prior discussion of the legal principle that a reference that teaches away from the claim limitation cannot be used to form a prima facie rejection.

Para. 38 of the Office Action argues that “a different teaching or teaching a different way is not equivalent to ‘teaching away’ from a claimed limitation.” Yes, it is, in this case. When prior art is being interpreted on the same limitation as the rejected claim, and teaches a numerical value outside of and inconsistent with the range recited in the claim, that is a teaching away from the claim limitation.

Schaeffer '110 teaches an oxidation time of “...greater than 1 Hr...”, which is inconsistent with the teaching of Duderstadt.

The explanation of the rejection contains some speculation about achieving thicker oxide layers on the bond coats. If one follows the teachings of Schaeffer '110, one would in fact go to higher temperatures, “above 1000°C” (col 4, line 49). The higher temperature would have produced the thicker oxide layer discussed in Duderstadt, so that a longer time, directly contrary to the teachings of Duderstadt, would not be necessary. After all, it is this very teaching of Schaeffer '110 that is relied upon for the temperature limitation of claim 11, so it should be relied upon for the teaching of how to produce a thicker oxide.

Applicant incorporates its discussion and requests regarding the need for an objective basis for combining the teachings of the references.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claim 12 is rejected under 35 USC 103 over Duderstadt '752 in view of Bruce '088, and further in view of Strangman US Patent 5,514,482. Applicant traverses this ground of rejection.

Claim 12 depends from claim 1. The combination of Duderstadt and Bruce does not teach the recitations of claim 1 for the reasons stated earlier, which are incorporated here. Strangman adds nothing in this regard. Claim 12 is therefore allowable over this ground of rejection.

The argument presented in the explanation of the rejection is the same one found in para. 16 of the Office Action. As noted above, the references have no such teaching.

Applicant incorporates its discussion and requests regarding the need for an objective basis for combining the teachings of the references.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claim 22 is rejected under 35 USC 103 over Beele US Patent 6,127,048 in view of Bruce '088. Applicant traverses this ground of rejection.

Beele teaches that the "stabilized or partly stabilized zirconia" must be deposited on an anchoring layer that is a spinel, a pyrochlore, or a perovskite (claim 1), all of which are ternary oxides (col. 3, lines 40-51). This is a critical teaching of Beele, which requires the anchoring layer 3 to be of this type for the invention to be operable. Bruce, on the other hand, teaches that the "zirconia partially stabilized with less than six weight percent yttria" must be deposited on an Al_2O_3 scale, a binary oxide (col. 3, lines 31-41). If the approach of Beele is amended to incorporate the teachings of Bruce, then the anchoring layer 3 of Beele must be modified to be a binary Al_2O_3 layer, not the ternary oxide layer required by Beele. MPEP 2143.01 provides that, in constructing a

sec. 103 rejection, the proposed modification cannot render the prior art unsatisfactory for its intended purpose or change the principle of operation of a reference. This mandate is violated by the proposed approach, because the ternary oxide required by Beele would no longer be present.

If, on the other hand, it is argued that only the helpful teaching of Bruce, the composition of the partially stabilized zirconia, is imported from Bruce, then this is clearly a hindsight reconstruction, where only the helpful portion of the reference is selected and the unhelpful portion is disregarded. The selective use of only the helpful teachings of a reference, and not giving weight to the overall teachings of the reference, in this manner is a per se hindsight reconstruction. This approach is not proper. In In re Mercer, 185 USPQ 774, 778 (CCPA 1975), the CCPA stated:

"The relevant portions of a reference include not only those teachings which would suggest particular aspects of an invention to one having ordinary skill in the art, but also those teachings which would lead such a person away from the claimed invention. See In re Lunsford, 53 CCPA 986, 357 F.2d 380, 148 USPQ 716 (1966)."

"The Board's approach amounts in substance, to nothing more than a hindsight 'reconstruction' of the claimed invention by relying on isolated teachings of the prior art without considering the over-all context within which those teachings are presented. Without the benefit of appellant's disclosure, a person having ordinary skill in the art would not know what portions of the disclosure of the reference to consider and what portions to disregard as irrelevant, or misleading. See In re Wesslau, 53 CCPA 746, 353 F.2d 238, 147 USPQ 391 (1965)."

Accordingly, the attempt to combine the inconsistent teachings of Beele and Bruce is improper and cannot be done.

Applicant incorporates its discussion and requests regarding the need for an

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objective basis for combining the teachings of the references.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 1-11 and 13-23 are rejected under the doctrine of obviousness-type double patenting over Spitsberg US Patent 6,576,067 in view of Bruce '088. Applicant traverses this ground of rejection.

Claims 1-11 and 13-23 are rejected under the doctrine of obviousness-type double patenting over Spitsberg US Patent 6,565,672 in view of Bruce '088. Applicant traverses this ground of rejection.

Applicant traverses these rejections on the grounds that there is no objective basis for combining the teachings of the pairs of references in each case. Applicant incorporates its discussion and requests regarding the need for an objective basis for combining the teachings of the references.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Applicant submits that the application is in condition for allowance, and requests such allowance.

Respectfully submitted,



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